Slipping Rib Syndrome

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Three cases of slipping rib syndrome are presented. The pertinent anatomy of the costal margin and nerve supply are reviewed. The treatment of the disease is presented along with case histories. This entity is little known to the medical profession, although first described in 1919. Probably far more common than is realized, it should always be included in the differential diagnosis of thoracic and abdominal pain.

The slipping rib syndrome was first described by Cyriax in 1919.[1] He noted that the anterior end of a rib might be dislocated onto the costal margin anteriorly producing a characteristic lancinating type of pain that was quite disabling. Apparently, not a great deal of attention was paid to this discovery, as in 1922 Davies-Colley[2] reported two cases of his own which were cured surgically. No mention was made of Cyriax's earlier paper. From those early reports up to the present, reports on slipping rib have been sporadic. One wonders how many patients have undergone needless laparotomy with the diagnosis being missed. Recently, three cases have come to the authors' attention in which the patients had characteristic symptoms of the slipping rib syndrome which had been missed by their physicians, in one case for 18 years.

Case Reports

Case 1

A 52-year-old man presented in March 1977 with a four-year history of left sided pain. He stated that the pain had begun shortly after his third hiatus hernia operation, utilizing a thoracoabdominal approach, had been performed. At that time he was told that "some ribs had been fractured." No provocative-palliative factors, such as straining, eating, or exercise were associated with the pain. The pain was described as sharp and stabbing, localized just at or below the left costal margin and most intense at the anterior axillary line. It did not radiate. The pain would last for hours and was not appreciably diminished by rest or analgesics. He had a thoracic rhizotomy performed in April 1975 which provided complete anesthesia over the affected area for approximately six months after which the pain recurred.

A fourth hiatus hernia repair, via the transthoracic approach, was performed in May 1975 following which symptoms of gastroesophageal reflux completely and permanently abated. An electromyogram was performed in February 1976 and reported as normal. In March 1977 he was re-examined and for the first time the hooking maneuver, as described by Heinz,[3] was performed. His pain was reproduced exactly. At that time a distinct "popping" sensation was elicited by the examiner. On March 28, 1977 he was taken to the operating room. Prior to anesthesia the area of pain over the left costal margin was delineated exactly. An incision over the left costal margin was then made with the patient under general anesthesia. Slips of cartilage from the ninth and tenth ribs were noted to be subluxed beneath the costal margin. Upon appropriate manipulation they rotated over the costal margin briskly. These cartilages were excised subperichondrially. Postoperatively the patient was pain-free and discharged on the second postoperative day. Eighteen months following surgery, he remains pain-free.

Case 2

A 68-year-old woman reported left upper quadrant pain present for 18 years. She had suffered a fall in which she "wrenched" her back. She recalled making a vigorous turn of her upper torso in attempting to break her fall. Shortly after this incident, she began having bouts of lancinating pain just beneath her left costal margin. Although the pain was usually confined to the left upper quadrant, occasionally it would extend to the epigastrium. At times the pain was described as a "dull ache," located beneath the left costal margin. The pain was occasioned by sudden movements, especially twisting or bending and lasted for several hours once initiated.

After some years of unsuccessful treatment with various analgesics and a tight corset, her physician obtained an upper gastrointestinal barium x-ray series and an oral cholecystogram.

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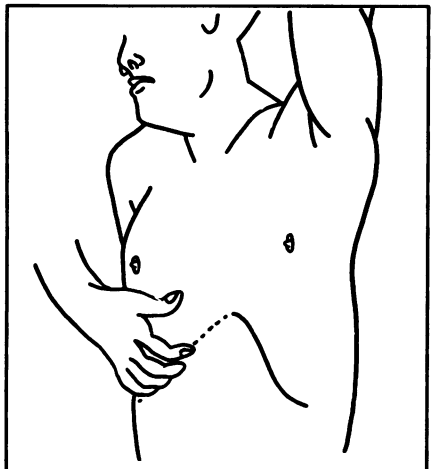

Figure 1. Sketch of hooking maneuver. The examiner curls fingers beneath the costal margin and lifts straight up. A positive finding will be exact reproduction of the patient's pain

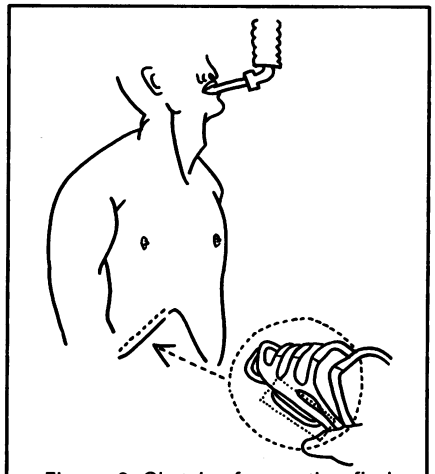

Figure 2. Sketch of operative findings. An abnormal rib projection beneath the costal margin is the usual finding. Excision of the offending portion of rib is all that is necessary to cure the syndrome

Cholelithiasis diagnosed by these studies prompted a cholecystectomy in 1971. She was unrelieved of her original pain. Surgical consultation was sought in 1977. Careful physical examination was unremarkable with the exception of exact reproduction of her pain with the use of the hooking maneuver. Her physician was confronted with the physical findings. He was also presented with historical references relative to the slipping rib syndrome. Despite the evidence, he declined to recommend surgery to the patient. She was discharged from the hospital and subsequently lost to follow-up.

Case 3

The patient, a 29-year-old woman, was admitted to Jewish Hospital with a two-year history of left anterior chest pain. The patient noted no provocative-palliative factors such as eating, straining, exercise or cessation of same. The pain was described as sharp, confined to the left upper quadrant "just under my ribs." The pain was severe enough to stop any activity in which the patient was engaged. It lasted two to three minutes and occurred five to ten times a day. She had consulted numerous physicians and had been placed on various analgesics without success. Physical examination was unremarkable except for the findings in the left upper quadrant. Upon employing the hooking maneuver to the left costal margin, a distinct "popping" sensation was appreciated. The patient immediately stated that her pain had been reproduced exactly by this maneuver. Operation was carried out on October 31, 1978. The tenth rib was clearly demonstrated to move over the costal margin on appropriate manipulation. There was a similar motion of the ninth rib. Both were excised. The patient had a smooth postoperative course and was discharged on the second postoperative day. When seen a month later the patient noted that she now enjoyed a pain-free life style for the first time in two years.

Discussion

Etiology is intricately associated with anatomy in this syndrome. The anterior ends of the cartilages of ribs eight, nine, and ten are attached to the one above by a fibrous union encompassing the interchondral synovial membranes of the interchondral articulations. This makes for a desirable mobility of the chest wall in respiration. The intercostal nerves pass ventrally in the intercostal spaces with the intercostal vessels; from the vertebral column to the angles of the ribs they lie between the pleura and the posterior intercostal membrane; from the angle to the middle of the ribs they pass between the Intercostales interni and externi. They then enter the substance of the Intercostales interni where they remain concealed until they reach the costal cartilages, where they again emerge on the inner surface of the muscle and lie between it and the pleura. The nerves are inferior to the vessels and with them beginning proximal to the rib above, but as they proceed ventrally may approach the middle of the intercostal space. Near the sternum they pass ventral to the Transversus thoracis and the internal thoracic vessels, and near the sternum pierce the Intercostalis internus, the anterior inter costal membrane, the Pectoralis major and pectoral fascia, terminating as the anterior cutaneous nerves of the thorax. At the front of the thorax some of the branches cross the costal cartilages from one intercostal space to another. Each nerve is connected with the adjoining ganglion of the sympathetic trunk by a gray and white ramus communicans.[4]

It is obvious that, with the intercostal nerve lying superficially on the inner surface of the anterior rib end, the possibility of nerve irritation exists when the anterior end of the rib cartilage slips beneath the cartilage above. The close association of the intercostal nerves with the sympathetic system most certainly accounts for the symptoms which are often mistaken as being visceral in nature. One wonders as to the possible involvement of the synovial membrane in producing, or at least precipitating, the causation of pain. Holmes,[5] in 1941, and more recently McBeath,[6] studied the synovial membranes from surgical specimens. No abnormality could be found.

With the foregoing discussion in mind, pertinent inquiries into the etiology of the slipping rib syndrome may

be made. It seems almost certain that nerve irritation caused by the rib (actually the cartilaginous anterior end of the rib) is the cause of the patients' symptoms. The fact that the intercostal nerve is anatomically located anteriorly in such a way as to make it subject to injury has a logical appeal. This logic is borne out in that in every case reported, relief of pain was obtained by resection of the offending rib tip.[2,3,5-7]

Whether direct or indirect trauma is the immediate cause of disability is difficult to ascertain. However, it seems likely that the initial injury is probably discounted by the patient and forgotten. It is quite evident from the literature that most investigators were unable to gain an admission from the majority of patients of a particular traumatic incident antedating the onset of pain. Direct injuries, such as blows to the ribs in athletic activity or striking the dashboard during an automobile accident, are usually quite dramatic and likely to be recalled. Holmes pointed out that indirect forces such as sudden extension or flexion, repeated one-sided weight bearing, straining as in childbirth, and many other forces are indirect mechanisms of injury which are not likely to be remembered.

The diagnosis of this disease is one of exclusion. Because there may be visceral components to the pain, one must rule out thoracic or abdominal disease. The main point of diagnosis is knowledge of the disease and a high index of suspicion. Heinz[3] reported a simple technique for ascertaining the presence of the slipping rib. One simply "hooks" curved fingers under the inferior rib margins and pulls anteriorly (Figure 1). In the presence of a slipping rib the pain is usually reproduced exactly. Since the condition is always unilateral, performing the manuever on the contralateral side will serve as a control.

There are various methods of treatment, which may be determined by the patient. If he or she is willing to endure the pain, then repeated sessions of corticosteroid injection along with a local anesthetic can give varying amounts of relief. However definitive therapy is afforded only by surgery.

An incision is made along the costal margin directly over the point of maximum tenderness. The rib tip will be found to be subluxed under the costal margin (Figure 2) and an operative hooking manuever can be performed to demonstrate the pathology. Almost always either the eighth, ninth, or tenth ribs are involved. Care must be taken to inspect all three ribs and perform appropriate resection. Following resection all cases reported in the literature and the two cases reported here were free of pain.

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